

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

RE THE PATENT APPLICATION OF: Laurent Bellaiche, Aaron M. George and  
Jorge Iniguez

Appl. No.: 10/632,740

Group Art Unit: 1755

Filed: 08/01/03

Examiner:

For: Enhanced Electromechanical Properties in Atomically-Ordered Ferroelectric Alloys

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**TRANSMITTAL OF INFORMATION DISCLOSURE STATEMENT**  
**WITHIN THREE MONTHS OF FILING OR BEFORE**  
**THE MAILING DATE OF THE FIRST OFFICE ACTION**

1. Transmitted herewith is an Information Disclosure Statement for this application. Also enclosed is a self-addressed, stamped postcard.
2. This Information Disclosure Statement is being transmitted within three months of the filing date of the application or date of entry into the national

**CERTIFICATE OF MAILING**

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

on: \_\_\_\_\_

*Feb. 25, 2004*

*Ray F. Cox, Jr.*

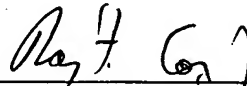
Ray F. Cox, Jr.

national stage of an international application or before the mailing date of a first Office Action on the merits, whichever event occurs last. 37 CFR 1.97(b).

3. No fee is due.

Date: 2/25/2004

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Mr. Aaron M. George, w/encl.  
Dr. Jorge Iniguez, w/encl.



Attorney Docket No. 8793-52026

**PATENT**

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**INFORMATION DISCLOSURE STATEMENT**

Applicants submit herewith patents, publications or other information of which they are aware, which they believe may be material to the examination of this application and in respect of which there may be a duty to disclose.

Some of the documents attached hereto may have markings thereon. No significance is meant to be attached to the markings. These documents are not necessarily analogous art.

The filing of this Information Disclosure Statement shall not be construed as a representation that a search has been made, an admission that the material cited is, or is considered to be, material to patentability or that no other material information exists.

The filing of this Information Disclosure Statement shall not be construed as an admission against interest in any manner. A list of the patents and other documents

which accompanies this statement is set forth on the attached modification to Form PTO/SB/08B. A copy of each of the items on the attached list is supplied herewith.

#### OTHER INFORMATION

Applicants wish to bring to the examiner's attention the following information:

Cite No. DD. An oral presentation entitled "Finite-Temperature Properties of Ferroelectric Alloys From First-Principles" was given at a meeting of the American Physical Society at Seattle Washington on March 12-16, 2001. A copy of the published abstract of the presentation is Cite No. CT. A copy of the unpublished overhead slides used in the oral presentation, comprising 20 pages, is attached hereto. This information is identified on the attached list as Cite No. DD. It is requested that this information be considered by the examiner and an initialed copy of the attached list returned to the undersigned.

Cite No. DE. An oral presentation entitled "Composition Modulation in  $b(\text{Sc,Nb})\text{O}_3$  Alloys" was given at a meeting entitled Fundamental Physics of Ferroelectrics 2001 at Williamsburg Virginia on February 4-7, 2001. An abstract of the presentation was published in the AIP Conference Proceedings. A copy of the abstract is Cite No. CU. A copy of the unpublished overhead slides used in the oral presentation, comprising 16 pages, is attached hereto. This information is identified on the attached list as Cite No. DE. It is requested that this information be considered by the examiner and an initialed copy of the attached list returned to the undersigned.

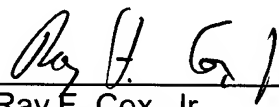
Cite No. DG. Cite Nos. CG, CL, CR, CS, CT, CU, CY, CZ, DA, DD and DE are considered especially pertinent to the application as disclosing work of the inventors in

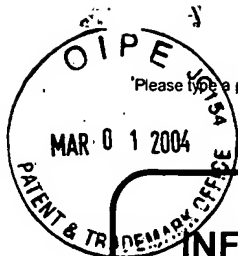
the field of the invention. The entirety of Cite No. DA is considered pertinent to the application and particularly the first paragraph on page 060102-4. This information is identified on the attached list as Cite No. DG. It is requested that this information be considered by the examiner and an initialed copy of the attached list returned to the undersigned.

The person making this statement is the attorney who signs below on the basis of information in the attorney's file.

Respectfully submitted,

Date: 2/25/2004

  
\_\_\_\_\_  
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## INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet

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### Complete if Known

Application Number	10/632,740
Filing Date	08/01/2003
First Named Inventor	Bellaiche, L.
Group Art Unit	1755
Examiner Name	
Attorney Docket Number	8793-52026

### NON PATENT LITERATURE DOCUMENTS

Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T
	CA	ABE, K., et al., Ferroelectric Properties in Epitaxially Grown $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$ Thin Films, J.Appl.Phys., Vol. 77, pp. 6461-6465, 15 June 1995.	
	CB	UCHINO, K., Piezoelectric Actuators and Ultrasonic Motors, Kluwer Academic, Boston, 1996, pp. 1-11.	
	CC	SAI, N., et al., Compositional Inversion Symmetry Breaking in Ferroelectric Perovskites, Phys.Rev.Lett., Vol. 84, pp. 5636-5639, 12 June 2000.	
	CD	PARK, S-E., et al., Ultrahigh Strain and Piezoelectric Behavior in Relaxor Based Ferroelectric Single Crystal, J.Appl.Phys., Vol. 82, pp. 1804-1811, 15 August 1997.	
	CE	SERVICE, R., Shape-changing Crystals Get Shiftier, Science, Vol. 275, pp. 1878-0, 28 March 1997, 3 pages.	
	CF	NOHEDA, B., et al., A Monoclinic Ferroelectric Phase in the $\text{Pb}(\text{Zr}_{1-x}\text{Ti}_x)\text{O}_3$ Solid Solution, Appl.Phys.Lett., Vol. 74, pp. 2059-2061, 5 April 1999.	
	CG	BELLAICHE, L., et al., Finite-temperature Properties of $\text{Pb}(\text{Zr}_{1-x}\text{Ti}_x)\text{O}_3$ Alloys from First Principles, Phys.Rev.Lett., Vol. 84, pp. 5427-5430, 5 June 2000.	
	CH	HEMPHILL, R., et al., Finite-temperature Properties of Disordered and Ordered $\text{Pb}(\text{Sc}_{0.5}\text{Nb}_{0.5})\text{O}_3$ Alloys, Appl.Phys.Lett., Vol. 77, pp. 3642-3644, 27 November 2000.	
	CI	HOHENBERG, P., et al., Inhomogeneous Electron Gas, Phys.Rev., Vol. 136, pp. B864-871, 9 November 1964.	
	CJ	KOHN, W., et al., Self-consistent Equations Including Exchange and Correlation Effects, Phys.Rev., Vol. 140, pp. A1133-1138, 15 November 1965.	
	CK	VANDERBILT, D., Soft Self-consistent Pseudopotentials in a Generalized Eigenvalue Formalism, Phys.Rev.B, Vol. 41, pp. 7892-7895, 15 April 1990.	
	CL	BELLAICHE, L., et al., Virtual Crystal Approximation Revisited: Application to Dielectric and Piezoelectric Properties of Perovskites, Phys.Rev.B, Vol. 61, pp. 7877-7882, 15 March 2000.	

Examiner  
Signature

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Sheet 2 of 3

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	CM	CHU, F., et al., Spontaneous (Zero-field) Relaxor-to-ferroelectric-phase Transition in Disordered Pb(Sc <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> , J.Appl.Phys., Vol. 77, pp. 1671-1676, 15 February 1995.	
	CN	VANDERBILT, D., et al., Monoclinic and Triclinic Phases in Higher-order Devonshire Theory, Phys.Rev.B, Vol. 63, pp. 094108-1 to 094108-9, 29 January 2001.	
	CO	RAMER, N., et al., Application of a New Virtual Crystal Approach for the Study of Disordered Perovskites, J.Phys.Chem.Solids, Vol. 61, pp. 315-320, Elsevier Preprint, 14 June 1999, 14 pages.	
	CP	FU, H., et al., Polarization Rotation Mechanism for Ultrahigh Electromechanical Response in Single Crystal Piezoelectrics, Nature, Vol. 403, pp. 281-282, 20 January 2000.	
	CQ	BRAZIER, M., et al., Unconventional Hysterisis Behavior in Compositionally Graded Pb(Zr, Ti)O <sub>3</sub> Thin Films, Appl.Phys.Lett., Vol. 72, pp. 1121-1123, 2 March 1998.	
	CR	INIGUEZ GONZALES, J., Doctoral Dissertation, Calculos ab initio Hamiltonianos efectivos para el estudio de materiales ferroelectricos, Universidad del Pais Vasco, Spain, December 2000, 112 pages.	X
	CS	GEORGE, A., Master's Thesis, Composition Modulation in Pb(Sc <sub>1/2</sub> Nb <sub>1/2</sub> )O <sub>3</sub> (PSN), University of Arkansas, Fayetteville, Arkansas, December 2001, 43 pages.	
	CT	BELLAICHE, L., Abstract, Finite-Temperature Properties of Ferroelectric Alloys from First Principles, Meeting of the American Physical Society, Seattle, Washington, March 12-16, 2001, 1 page.	
	CU	BELLAICHE, L. et al., Abstract, Composition Modulation in Pb(Sc, Nb)O <sub>3</sub> Alloys, Fundamental Physics of Ferroelectrics 2001, Williamsburg, Virginia, February 4-7, 2001, Proceedings published in AIP Conference Proceedings, 2 pages.	
	CV	Website, <a href="http://advancement.uark.edu">http://advancement.uark.edu</a> , Researchers Discover Optimal Energy State that Underlies Ultrasound, Radar Devices, September 5, 2001, 3 pages.	
	CW	Website, <a href="http://advancement.uark.edu">http://advancement.uark.edu</a> , University of Arkansas Research Frontiers-Optimal Energy States, Spring 2002, printed from website July 24, 2002, 2 pages.	
	CX	BLOUIN, M., Science of the Small, University of Arkansas Research Frontiers, Fayetteville, Arkansas, Spring 2002, pp. 14-15.	

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	CY	GEORGE, A., et al., Anomalous Properties in Ferroelectrics Induced by Atomic Ordering, Nature, Vol. 413, pp. 54-57, 6 September 2001.	
	CZ	INIGUEZ, J., et al., Ab Initio Design of Perovskite Alloys with Predetermined Properties: The Case of $\text{Pb}(\text{Sc}_{0.5}\text{Nb}_{0.5})\text{O}_3$ , Physical Review Letters, Vol. 87, 27 August 2001, pp. 095503-1 to 095503-4.	
	DA	GEORGE, A., et al., Composition Modulation Away from the Polar Direction in $\text{Pb}(\text{Sc}, \text{Nb})\text{O}_3$ Alloys, Physical Review B, Vol. 64, 18 July 2001, pp. 060102-1 to 060102-4.	
	DB	New Release, Weird Energy: Physicists Uncover Unusual Properties in Ferroelectric Superlattices, University of Arkansas, Fayetteville Arkansas, August 28, 2003, 2 pages.	
	DC	KORNEV, I., et al., Unusual Thermodynamic Properties and Nonergodicity in Ferroelectric Superlattices, Physical Review Letters, Vol. 91, September 12, 2003, pp. 116103-1—116103-4.	
	DD	Other Information, Oral Presentation, Finite-Temperature Properties of Ferroelectric Alloys from First-Principles, American Physical Society, Seattle Washington, March 12-16, 2001.	
	DE	Other Information, Oral Presentation, Composition Modulation in $\text{Pb}(\text{Sc}, \text{Nb})\text{O}_3$ Alloys, Fundamental Physics of Ferroelectrics 2001, Williamsburg Virginia, February 4-7, 2001.	
	DF	AL-BARAKATY, A., et al., Global and Secondary Ferroelectric Minima in Ordered $\text{Pb}(\text{Sc}_{0.25}\text{Nb}_{0.25}\text{Ti}_{0.5})\text{O}_3$ Alloys, Applied Physics Letters, Vol. 81, September 23, 2002, pp. 2442-2444.	
	DG	Other Information, Citations identified as especially pertinent.	

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